**EXAMINER'S AMENDMENT**

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

**IN THE TITLE:**

The title was changed to:

Maze Creating Method, Antenna Optimum Designing Method, Program, and Antenna, Using two-bit/quaternary chromosomes

Authorization for this examiner's amendment was given in a telephone interview with Jason Perilla on 8/30/10.

The application has been amended as follows:

**IN THE CLAIMS:**

The claims have been amended as follows:

Claim 1: A maze generation method for generating a maze, using a genetic algorithm, the method comprising:

dividing a given plane into shapes to produce generated blocks;

setting alternate blocks of the generated blocks to be reference point blocks;

assigning a two-bit chromosome to each reference point block, ~~the chromosomes~~ each two-bit chromosome used for ~~determining~~ controlling blocks which are set to be contiguous on sides of the reference point blocks; and

optimizing, by a processor, the chromosomes assigned to the reference point blocks by the genetic algorithm, to generate an optimum maze.

Claim 2: An antenna optimum design method for designing a structure of an antenna having a metal patch placed on an antenna element plane, using a genetic algorithm, the method comprising:

dividing the metal patch on the antenna element plane into blocks to produce generated blocks;

setting alternate blocks of the generated blocks to be reference point blocks;

assigning a two-bit chromosome to each reference point block, ~~the chromosomes~~ each two-bit chromosome used for ~~determining~~

controlling blocks which are arranged to be contiguous on sides of the reference point blocks;

calculating characteristics of an antenna uniquely determined by the assigned chromosomes; and

optimizing the chromosomes assigned to the reference point blocks by the genetic algorithm, to optimize characteristics of the antenna.

Claim 3: The antenna optimum design method as set forth in claim 2, wherein

the antenna includes an unfed element plane formed in parallel with the antenna element plane with a metal patch placed on a surface thereof, and

the metal patches on the antenna element plane and the unfed element plane are divided into given shapes in the dividing.

Claim 4 (Currently Amended): The antenna optimum design method as set forth in claim 2, wherein

the antenna includes a ground plane with a metal surface, a short-circuit element for short-circuiting the metal patch on the antenna element plane and the metal surface on the ground

plane, and a feed point connected to the ground plane for feeding the metal patch on the antenna element plane, and

the metal patch is placed in a block to which the short-circuit element and the feed point are connected.

Claim 5: The antenna optimum design method as set forth in claim 2, wherein

the antenna includes a ground plane with a metal surface and a short-circuit element plane with a metal patch placed on a surface thereof,

the metal patch placed on the short-circuit element plane constitutes a short-circuit element for short-circuiting the metal patch on the antenna element plane and the metal surface on the ground plane, and

the metal patches on the antenna element plane and the short-circuit element plane are divided into given shapes to produce the generated blocks in the dividing.

Claim 6: The antenna optimum design method as set forth in claim 5, wherein

the antenna includes a feed point with a central conductor connected to the metal patch on the antenna element plane and an outer conductor connected to the metal surface on the ground plane, and

the chromosomes include a position coordinate of the feed point on the short-circuit element plane.

Claim 7: The antenna optimum design method as set forth in claim 2, wherein

return loss characteristics and gain characteristics at multiple frequencies are used as the antenna characteristics.

Claim 8: The antenna optimum design method as set forth in claim 2, wherein

when it is decided that all metal patches in blocks surrounding a generated block be removed in the optimizing, it is decided that a metal patch in the generated block be removed.

Claim 9: The antenna optimum design method as set forth in claim 2, wherein

when it is decided that not all metal patches in blocks surrounding a generated block be removed in the optimizing, it is decided that a metal patch in the generated block not be removed.

Claim 10: A non-transitory computer readable storage medium storing computer readable instructions thereon that, when executed by a processor, direct the processor to implement an antenna optimum design method for designing a structure of an antenna, comprising:

dividing a metal patch on an antenna element plane into blocks to produce generated blocks;

setting alternate blocks of the generated blocks to be reference point blocks;

assigning a two-bit chromosome to each reference point block, ~~the chromosomes~~ each two-bit chromosome used for ~~determining~~ controlling blocks which are arranged to be contiguous on sides of the reference point blocks;

calculating characteristics of an antenna uniquely determined by the assigned chromosomes; and

optimizing the chromosomes assigned to the reference point blocks by the genetic algorithm, to optimize characteristics of the antenna.

Claim 11: An antenna designed by an antenna optimum design method, comprising:

dividing a metal patch on an antenna element plane into blocks to produce generated blocks;

setting alternate blocks of the generated blocks to be reference point blocks;

assigning a two-bit chromosome to each reference point block, ~~the chromosomes~~ each two-bit chromosome used for ~~determining~~ controlling blocks which are arranged to be contiguous on sides of the reference point blocks;

calculating characteristics of an antenna uniquely determined by the assigned chromosomes; and

optimizing the chromosomes assigned to the reference point blocks by the genetic algorithm, to optimize characteristics of the antenna.

Claim 12. The maze generation method for generating a maze of Claim 1, wherein

setting alternate blocks of the generated blocks includes setting blocks in alternate rows of alternate columns of the generated blocks to be reference point blocks,

assigning a chromosome to each reference point block includes assigning a two-bit chromosome to each reference point block, and

sides of the reference point blocks include walls in the maze generation method.

Claim 13. The maze generation method for generating a maze of Claim 1, wherein

optimizing the chromosomes assigned to the reference point blocks includes searching, by a genetic algorithm, optimized values of the chromosomes assigned to the reference point blocks, to optimize the characteristics of a meander-line antenna according to maximum and minimum values of an evaluation function.

**REASONS FOR ALLOWANCE**

1. The following is an Examiner's statement of reasons for allowance: Claims 1-13 are considered allowable since when reading the claims in light of the specification, as per MPEP §2111.01 or Toro Co. v. White Consolidated Industries Inc., 199 F.3d 1295, 1301, 53 USPQ2d 1065, 1069 (Fed. Cir. 1999), none of the references of record alone or in combination disclose or suggest the combination of limitations specified in the independent claims including assigning a two-bit chromosome to each reference point block, each two-bit chromosome used for controlling blocks which are set to be contiguous on sides of the reference point blocks, as specified in the independent claims.

The Examiner was persuaded by the arguments filed 8/9/10.

Any comments considered necessary by Applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David R. Vincent whose telephone number is (571) 272-3080.

**Any response to this action should be mailed to:**

Commissioner of Patents and Trademarks,

Washington, D. C. 20231;

**Hand delivered to:**

Receptionist,
Customer Service Window,
Randolph Building,
401 Dulany Street,
Alexandria, Virginia 22313,
(located on the first floor of the south side of the Randolph Building);or

**faxed** to:

**(571) 272-3150** (for formal communications intended for entry.)

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/David R Vincent/
Primary Examiner, Art Unit 2129